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CONTENTS

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A COMMON-SENSE CALENDAR

OUR present Calendar is merely a rough tool. We can readily calculate dates inside of each month, and with some figuring we can reckon a month or two ahead. But when we are called upon to connect the proper week-day with some date more than two months ahead or behind, scarcely one of us can perform the operation without reference to a calendar. Current-year calendars are generally accessible, but it is no easy matter to ferret out old dates. It is even more difficult to determine dates in future years. In short, our measuring scale for dates is faulty. Like the Roman numerals it is unsuited for any but the simplest problems.

Who, for example, can find out for himself on what day of the week he was born? On what day of the week was the Declaration of Independence signed, or the Battle of Waterloo fought?

If your lease expires October 1 (or May 1), and you have to move, in what part of the week will this happen? If you have a regular engagement the first Monday of each month, will it conflict with another engagement on the third of next month or the month after? What months this year have five Sundays? How many annoying mistakes have you made during your life in such calculations?

If a ninety-day note or a three-month note is to be paid, on what day of the week is it due? Some quarters are longer than others, making the exact reckoning of interest difficult. Weekly periods of earnings in one year are not exactly comparable with the corresponding periods in other years. Holidays, like interest days, fall on different week-days in different years—sometimes very awkwardly.

The lopsidedness of our calendar is due to the Emperor Augustus, who insisted that his month should contain as many days as the month of Julius Cæsar. As a matter of his-

THE NEW ERA CALENDAR

January				*July*		
		April				*October*
Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
[Y]	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	*	*	*	*

February				*August*		
		May				*November*
Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
*	*	*	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	*	*

March			*September*			
	June					*December*
Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
*	*	*	*	*	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	[L]	*	*	*	*	*

THE MONTHLESS OR EXTRA DAYS

[Y]—THE YEAR-DAY precedes January 1 every year.

Rule: Divide number of year by 7; if the remainder is 0, the Year-Day is Year-Saturday; if the remainder is 1, Year-Sunday, etc. (Example: In 1904 Year-Day is "Year-Saturday.")

1919—Year-Sunday
1920—Year-Monday
1921—Year-Tuesday
1922—Year-Wednesday
1923—Year-Thursday
1924—Year-Friday

[L]—THE LEAP-DAY precedes July 1 every fourth year (excepting the years 1700, 1800, 1900, 2100, 2200, etc.).

Rule: Divide number of year by 28; if remainder is 0, the Leap-Day is Leap-Saturday; if remainder is 4, it is Leap-Sunday; if 8, Leap-Monday, etc. But there are no Leap-Days in years divisible by 100 and not by 400. (Example: There is no Leap-Day in 1900; in 1904 Leap-Day is "Leap-Saturday.")

1920—Leap-Wednesday
1924—Leap-Thursday
1928—Leap-Friday
1932—Leap-Saturday

tory this is interesting. But is it fitting that the modern world should be put to serious inconvenience, merely to commemorate the glories of the Augustan age?

Several suggestions have recently been made for a reformed Calendar. The "New Era Calendar" is original, I believe, in one particular. It proposes to take the first day of the year (the Year-Day) and the extra day in Leap Year (Leap-Day) out of the regular order of week-days and make them up into *weeks of their own.* In this Calendar, Year-Day belongs to no month at all; it comes in between December 31 and January 1. In years exactly divisible by 7, the Year-Day is Year-Saturday, the next year it is Year-Sunday, etc. Leap-Day comes between June 31 and July 1 once in 4 years (except in century years). In years divisible by 28 it is Leap-Saturday, 4 years later it is Leap-Sunday, etc.

Thus in 1919 the first day of the year is Year-Sunday, in 1920 it is Year-Monday, and so on—though the thirty-first of December is Sunday every year and the first of January is always Monday. The extra leap-year day in 1920 will be Leap-Wednesday, in 1924 Leap-Thursday, and so on. But June 31 is always Sunday and July 1 is always Monday.

Attempts to standarize the calendar so that each date would always fall on the same week-day have hitherto met with considerable opposition from church authorities and devout persons of many different creeds. They insist on scriptural grounds that the seventh day must always be set apart as a day of rest and religious observance. The present scheme provides for this exactly. There are 52 Sundays (and Saturdays) in each year, with one additional Sunday (and Saturday) once in seven years, and one more Sunday (and Saturday) once in seven leap years. This seems to meet fully the requirements of the church and of scripture.

In other respects the New Era Calendar copies an earlier Swiss[1] proposal. It is simple.

[1] By L. A. Grosclaude, of Geneva. Virtually the same scheme has been worked out (perhaps independently) by several persons of different nationalities. Camille Flammarion proposed something

The table given here is good for *any year.* Two months of 30 days are followed by one month of 31 days, making 13 weeks in each quarter. January, April, July and October are *exactly alike.* The first day of these four months is Monday—it is the same in every year. The first day of February, May, August and November is always Wednesday, and the first day of March, June, September and December is always Friday.

Each quarter has exactly 91 days; the monthless days (Year-Day and Leap-Day), being holidays, may be left out of account in reckoning interest, rents, wages, etc. Birthdays, wedding anniversaries, holidays and other notable dates fall on the same day of the week every year. Election Day is always November 7; Inauguration Day is always Monday. A college or school which opens on (say) the third Tuesday in September would always open September 19. These are but a few of the many ways in which reckoning is simplified.

Any person of ordinary intelligence can readily find the day of the week for any date in any year according to this Calendar. In a few minutes one can learn to associate Monday, Wednesday and Friday with the proper months, and the rest is easy. Even a school-child could answer without difficulty such questions as were asked at the outset, though they effectually baffle most of us under the present system. The Gregorian Calendar has fourteen different yearly arrangements; each of these involves a table of twelve months. The New Era Calendar calls for only *one table of three months.* If we consider the table of extra days as doubling the complexity of our scheme, the New Era Calendar is still twenty-five times simpler than the Gregorian.

Among the reconstructions which will undoubtedly follow the war, would it not be worth while to adopt a common-sense Calendar?

HOWARD C. WARREN

PRINCETON UNIVERSITY

rather similar in 1884, but Monsieur Grosclaude seems to have been given the first definite formulation. (See *Journal suisse d'horlogerie,* 1900, *24* pp. 378–9, and table on p. 356; also note in *Revue scientifique,* 1900, 4ᵉs. *13,* p. 766, where the present writer first saw it.) Flammarion repeated his proposal in 1901 (*La Revue, 37,* pp. 233–246). Alexander Philip proposed virtually the same plan in 1814. ("Reform of the Calendar," London: Kegan Paul, pp. 127.)

Several different schemes have also been suggested; *e. g.,* 13 months of 28 days each; and the matter was once discussed by an international commission. See also a number of communications in SCIENCE, 1910, *32.* The writer is unable to find that the idea of grouping the year-days into "year-weeks" has ever been suggested before.

CHEMICAL LITERATURE AND ITS USE

BUNSEN says, there are two distinct classes of men, those who work to enlarge the boundaries of knowledge, and those who apply that knowledge to practical uses. If we agree with a recent declaration that "chemistry is the intelligence department of industry," the modern chemist and particularly the chemical engineer, who is called on to answer all questions for every industry as well as know his own subject, needs to be aware of all possible sources of information.

Thus, a first-class chemist (including here the chemical engineer) must know and be able to use not books, only, but the periodical literature, journals, publications of societies and governments. He requires, then, a reading knowledge of German, with French if possible, and sufficient practise in English to enable him to make, both orally and in writing, a concise, clear report of work accomplished or planned, this being in addition to technical skill gained by training, and a liking for his work.

Specific training in this use of literature becomes a real problem where there are a number of students engaged individually in more or less advanced stages of research work, as seniors and graduate students.

Such training is given to a certain extent under various names, in a number of American technical schools and universities. Seniors are directed to find first what has been done on any problem assigned them. Even sophomores realize that the class texts are not the only books, while some join the American

Chemical Society and gain first-hand acquaintance with its journals. With a smaller number of students, we find, usually, limited library facilities, while, where more literature is available instructors have less time for individual direction of men to the sources of information.

Three years ago a brief study of current catalogs from about twenty institutions giving chemical courses similar to those at Illinois was made. From the data obtainable, the amount of work varied greatly. Meetings are held weekly, fortnightly, or monthly; attendance is for "any one interested"; for "graduate students and instructors"; meetings are "open to advanced undergraduates"; or attendance is "required of candidates for an advanced degree."

In only five of the institutions studied was there a definite statement as to credit given for the course. Case gave one hour, the second semester of the senior year; Ohio had a two-hour course second semester of junior year, required for chemists, but elective for chemical engineers. Michigan offered one to three hours, credit for senior chemical engineers, entrance to the course being by special permission; no statement of it for chemists was found. Massachusetts "Tech" required one hour a week the first semester for senior chemists, and two hours for senior chemical engineers. Chemists had to attend the instructors' journal club. Worcester Polytechnic Institute required a two-hour course the second semester for sophomores and a one-hour course all the junior year. None of these specifically stated training in use of the library as part of the course.

At Illinois, the existing junior journal course seemed to offer an opportunity for definite instruction and training in the use of reference books, abstract and review serials, and collective indexes, without adding an extra course to the well-filled schedule. Some account of the work so far and its results may be of interest; since several who looked it over at the April, 1916, meeting of the American Chemical Society have since used the outline, readings, lectures and problems, as a basis for similar courses elsewhere.

The journal course began as reports on recent numbers of foreign journals, at the first meetings of the Chemical Club in November, 1892. It appeared in the university catalog 1893–94 as "Chemistry 19. Seminary. Reports and discussions upon assigned topics from current chemical literature," with credit, and persisted as weekly or fortnightly meetings, being a prescribed course for juniors, seniors, and graduate students, with a few minor changes, till 1910–11, when a separate section for juniors was arranged, leaving seniors, graduates and instructors in the other section.

The revised journal-library course, now, as prescribed for all juniors in chemistry and chemical engineering, gives one hour credit each semester. It comprises study of the history of chemistry, chiefly biographical, based on the first volume of Kopp's "Geschichte der Chemie," with additional biographical papers in German or French. This gives opportunity for each student to make each semester two translations of fifteen to twenty pages, and two speeches. Then the twelve half-hour library lectures in the year, with problems for each one, give some practical experience in the actual use of books and serial publications. During the second semester the topics for translation are from current chemical serials, on recent important developments of the science. In 1915, 1916 and 1917, a summer school course was offered with lectures briefly covering the history of chemistry, and including class reports and all the library lectures, being considered as equivalent to either the first or second semester of the regular course according to the problems worked by the individuals.

The library lectures attempt to compel use of the books, works of reference and serials, in the chemistry library, by the students, so that they may at least know that such material exists and be able if called upon to utilize it. The lectures include explanation of the classification, catalog, and arrangement, of books; and serials; statements as to the fields covered

by the various works of reference; the general and special journals and society publications; discussion with explanation of the kind of information to be had in the different abstract, index and review serials; and information as to the best works available here in the several sections of chemistry, general, analytical, inorganic, mineral, organic, physiological, applied, theoretical, physical and colloid. The selection of these "best" works has been made or approved by the man who uses that section, before they are presented to the class for consideration. Frequent revision is of course necessary to keep the lists up to date. No parallel course is given elsewhere to my knowledge, and training of this kind has a money value, as well as does that in the laboratory proper, since many of the larger industrial plants have libraries and reference librarians, to help them keep up with current investigations and the effect upon their special problems. Little & Co., of Boston, is a good example.

Students are referred to what are the best, *i. e.*, most comprehensive and up-to-date books at any given time, and are compelled to some use of them. For example, some of the larger, important works at present, 1917, in the various divisions of chemistry at Illinois are:

Inorganic: Roscoe and Schorlemmer, edition four, 2 vols., and in German the Handbücher of Abegg and Gmelin-Kraut, edition 7, but both of these German texts are as yet incomplete, but have good bibliographies for the elements and the years they cover.

Organic: Meyer and Jacobson, "Lehrbuch," edition 2, has no equal in English, and the lack due to the fact that Vol. 2 has not come out may be supplied in part by the eleventh German edition of Richter's text-book, and in part by Hilditch's thirty-year course, in English, with Clarke's Introduction as a more elementary but modern work.

Analysis: Here is Treadwell, edition 4, 2 vols., for general, Gooch, Crookes and Classen for selected methods. Lunge in 6 volumes on technical, Allen in 8 for technical organic; for organic, Mulliken has at last got three volumes out with a promise of the fourth soon. Clarke's Handbook, and Weston on carbon compounds, are less comprehensive.

Biochemistry: Abderhalden's 10 volumes of methods are supplemented by Oppenheimer's volumes of general information. In English the series of monographs on biochemistry is being kept up and covers practically every topic.

Theoretical: Nernst, edition 7, in English is now available. Mellor's "Chemical Dynamics," and his book on mathematics for chemists, with Partington's are very useful.

Industrial: The newest books are old here as compared to the serials, but Martin's edition 2, Molinari and Sadtler, edition 4, do well for industrial organic. Molinari's inorganic industrial is a trifle old and Rogers, edition 2, does not include everything. The analytical texts have been mentioned and the number of special texts is great.

Of course, to do new work we must begin on the basis of present knowledge. It is assumed that the specialist will keep up in his own field, receiving publishers' circulars, and noting book reviews for new books. But given a new topic, or an unusual one, chemists should know how to find or at least where to search for what is known at present, quickly and surely. Here the organic chemist has an immense advantage, in the case of a known substance. Having the formula, Richter's "Lexikon" with its supplement will give him physical constants, the principal references to literature, and most important of all the page reference to Beilstein's "Handbuch," where he finds a concise careful summary.

Thus he has all information to and including 1911. The annual indexes of *Chemical Abstracts* and the *London Journal of the Chemical Society,* may be supplemented by the formula indexes, annual, of papers published in the *Annalen* and *Berichte.* Sometimes Abderhalden's "Biochemisches Handlexikon" is helpful, being newer than Beilstein and giving more information than Richter. If the substance is a coal-tar product, a dyestuff or the like, the volumes of Friedlaender's "Fortschritte" with subject indexes and collective indexes by German patent numbers, 1877 to 1914 inclusive, are invaluable. If the problem as processes or material is not listed under a special substance, Weyl and Lassar-Cohn give methods, in German of course. For preparations, adequate, brief and

timely, the organic volume of Vanino is the best at present and it gives plenty of references to original papers.

If these fail him, he, with the inorganic, physical and industrial man, must plunge into what librarians call the abstract and review serials, giving currently or for an annual period the literature with abstracts, and, in review serials, some critical discussion as well. There are many in English, German and French; perhaps a few suggestions may be of service—at least the plan has worked fairly, during a trial of six years with the senior graduate students and an occasional faculty member.

For rapid work, take those abstract serials in English first: when the ten-year collective index to *Chemical Abstracts* appears that will be for a time the best starting point. Barring that, take the annual indexes of the *Chemical Abstracts* or the *London Journal,* going back to the newest collective index of the *London Journal,* for 1903–12; then use these collective indexes, which take the literature back to 1841. If these articles and cross references are not enough, turn to Liebeg and Kopp's *Jahresbericht,* from 1847, but published so far only through 1910, and use collective indexes again. To insure finding everything, one may check by use of the collective indexes of the French *Bulletin,* 1858–1896, and *Chemisches Centralblatt;* the latter has no collective index published for 1880–96. For work done before 1847 there are two chief sources: (*a*) Berzelius's *Jahresbericht,* 1822 to 1850, with a collective index for the first twenty-five volumes; we have one also, made at Illinois, for the volumes 26–30; (*b*) the collective indexes of the *Annales,* 1789 to approximately 1870, when it ceased giving abstracts. For 1901 on, International Index to Scientific Literature: Chemistry, may give some references omitted by accident from the other lists, though it does not often happen. Supplementary too, are the collective indexes of the *Chemical News,* Vol. 1–100, and *Journal für praktische Chemie,* Vol. 1–100, but neither of these attempts to include all chemical literature. This list does not pretend to be complete, though the foregoing are enough in most cases, but some divisions of chemistry have excellent special publications; as, in agricultural chemistry the collective indexes of the *Experiment Station Record,* Biedermann's *Centralblatt* and Hoffmann's *Jahresbericht.* For industrial chemistry in general, the two indexes of the *Journal of the Society of Chemical Industry,* 1882–1905, the one, 1887–1907, of *Zeitschrift für angewandte Chemie* and two for Wagner's *Jahresbericht* for 1855–1894; here for dyes, explosives and coal-tar products in general the Friedlaender, noted for organic chemistry, is invaluable; biochemistry has a worthy rival to Beilstein and more up-to-date, in the indefatigable Abderhalden's "Biochemisches Handlexikon" and its supplement, ten volumes now, but without a collective index as yet; the *Biochemisches Zentralblatt,* dating from 1902, has only one collective index as yet; the most thoroughly satisfactory source for the time it covers is Maly's *Jahresbericht,* 1870 to date, though unfortunately the collective index for 1901–10 has not yet reached this country, if it has even appeared. For pharmaceutical chemistry, the 50-year Index to Proceedings, now continued as Yearbook, of the American Pharmaceutical Association, 1851–1902, is useful, as well as the collective and annual indexes of the *British Pharmaceutical Journal,* 1841 to date, and of the *American Journal of Pharmacy,* 1833 to date. The U. S., National-Standard, and the American Dispensatory, all give references, particularly to medical literature, not to be had elsewhere.

The work as offered seems in part to solve the problem, when the number of students is too large for individual instruction, and it has the advantage of calling to the students attention the literature in several divisions of chemistry, Seniors pride themselves on being able to find books on the shelves, as well as references for their own use. Some training is gained by presentation of the oral reports, since the outline for these is discussed with the instructor before presentation in class; the class furnishes a critical audience; notebooks are expected to contain date, topic, speaker,

reference, and some brief notes, for each report, and are called for at irregular intervals. A brief final examination is given.

Two to four seniors who have taken this course serve in the department library as student assistants. Three of the men found use for the training in library work in their commercial work during the past summer. One who had also worked in the department library has a good position as "reference librarian" with a large company interested in chemical work.

The library lectures alone have been used for reference by graduate students, especially those who have not had access to large libraries, and wish to learn what is available at Illinois.

MARION E. SPARKS

UNIVERSITY OF ILLINOIS

RESEARCH WORK AT THE UNIVERSITY OF MICHIGAN BIOLOGICAL STATION DURING THE SUMMER OF 1917

RESEARCH work was carried on at the biological station of the University of Michigan, by members of the instructional staff and by a number of students. Because of the lack of suitable laboratory space and equipment, the character of work undertaken was limited largely to systematic and ecological work on plants and animals, the behavior of birds, the embryology of certain fishes and life histories of parasitic worms. This is fundamental work, however, and as knowledge of the local fauna and flora is extended it is desired to give opportunity for careful physiological work. While the cold, late season doubtless interfered with certain investigations continued from previous years, it permitted the securing of many plants in blossom which in ordinary seasons have finished their blossoming before the opening of the station, and by retarding the breeding season of many animals an opportunity was given to take at the height of their breeding season several animals not usually found breeding during the session.

Dr. J. H. Ehlers, of the University of Michigan, collected about two thousand specimens of flowering plants comprising about two hundred and fifty species. A number of these represented genera and species not included in the published list of this region.

Mr. Lee Bonar, of the University of Michigan, under direction of Dr. Ehlers, collected plants affected with fungous diseases with the view of listing the host plants and studying the parasitic fungi.

Miss Margaret Pengelly, under Dr. Ehlers's direction, made a collection of the grasses of the region. Fifty species were collected, forty-five of which have been identified. Further collections are planned before publication of results.

Miss Lois Smith, of Colorado College, research assistant in botany, was engaged in the collection and study of sedges of the genus *Carex*. This work had been begun in 1914 when forty-nine species were collected and identified. During the past summer a large number of specimens were collected, among them a number of species not included in the previous list. The material is now being studied by Miss Smith and a published report on the work may be expected soon. The specimens belonging to the above collection will be placed in the herbaria of the station and of the university, while some will be available for exchange.

Dr. Richard M. Holman, of Wabash College, and Mr. Ernest Reed, of the University of Michigan, have made a beginning in the study of the aquatic cryptogamic plants. They devoted the greater part of their time to the identification of the algal forms of the lakes and streams of the region, to the study of the topography and hydrography of these lakes, and to collecting such facts as they were able relative to the spatial and seasonal distribution of the forms. Weekly temperature readings were made at ten foot depth intervals at four stations on Douglas Lake and at Lancaster, Munro and Vincent Lakes. Surface plankton hauls were taken at all these stations weekly, and plankton samples were taken at depth intervals of twenty feet in Douglas Lake. Bottom samples were also taken in order to determine diatom species not found

in the plankton during the summer. Many collections of algæ were made in other lakes, in various streams and bogs. Many determinations have been made and considerable preserved material awaits determination.

In plant ecology, instrumental field work on a new phase of the evaporation-plant-succession problem was carried on by B. H. Grisemer, of Sisseton, S. Dak., and E. E. Watson, of the University of Michigan, under the direction of Dr. F. C. Gates. Field work on a descriptive account of the plant associations and their successional relationships was continued and extended by Dr. F. C. Gates, of Carthage College.

Under the direction of Drs. Gates and Holman, the anatomical structure of the leaves of certain land plants, this year growing submerged, was investigated by Miss Mabel Hardy, of the Highland Park, Michigan, High School; the anatomy of *Scirpus validus* from different associations by Miss Winifred Corcoran, student in the University of Michigan, and the anatomical characteristics exhibited by the leaves of the dominant species of the hardwoods and the aspens by E. L. Lambert, of Carthage College.

Professor Max M. Ellis, of the University of Colorado, has brought the survey of the fishes of the region to a point where the publication of results seems desirable. This work has covered three problems: (*a*) The species of the region; (*b*) the local distribution of these species and (*c*) the relations between the existing fish fauna and that of the Great Lakes. Two papers on this work will be ready for publication shortly. He also studied the eggs and embryology of six species of fishes during the summer. Large series of embryo fishes were obtained for comparative studies. The first of these studies will be completed during the winter. Additional collections of a new species of Branchiobdellid worm (description now in press) were obtained, and some experiments concerning the feeding habits and food of these worms were carried on during the summer. These experiments were supplementary to work in progress at the University of Colorado. A collection of Branchiobdellid worms was made in the Lake Huron and Potagannissing Bay waters. These worms are in hand at present and the report will soon be sent to press.

Professor Ellis and Mr. G. C. Roe, of the University of Colorado, have recently published a paper in *Copeia* on the destruction of log perch eggs by suckers. This paper was based on data collected at the station during the past summer.

Mr. Roe has completed his collections of mosquitoes started last summer and expects to complete his work on these insects soon.

Dr. A. R. Cooper, of the University of Illinois, research assistant in zoology at the station, devoted his attention to the parasites of the fishes of the region with particular emphasis on the life-histories of the members of the cestode order, Pseudophyllidea. He examined one hundred and fifteen hosts belonging to seventeen species but took only three species of Pseudophyllidea. From young gulls, *Larus argentatus*, several cestodes, probably belonging to the genus *Diphyllobothrium* Cobbold, were taken. Many specimens of a cestodarian worm in various stages of development were taken from suckers.

Mr. H. C. Fortner, working under the direction of Dr. La Rue, studied the parasites of frogs from several localities of the region. Some interesting data on the local distribution of frog parasites were secured. So far as determined at present the only new species found was a species of the tapeworm *Ophiotænia*, which constitutes the first record of the taking of tapeworms of this genus from *Anura* of North America. Further collections are needed to complete the work.

Dr. George R. La Rue investigated the parasites of fishes, birds and snakes of the region. In all seventy-four hosts belonging to nineteen species were examined. A number of species not taken during the summer of 1912 were secured. The collections are being studied and it is hoped that they will yield interesting data on the distribution and life histories of certain parasites.

Professor R. M. Strong, of Vanderbilt University, continued his work on problems of

sense physiology and behavior in birds. For this purpose young herring gulls were secured, kept in a suitable cage on the beach and fed on small dead fishes until during the third and fourth weeks, all of the gulls but one died as the result of heavy trematode infestation secured from the fish. The death of these gulls seriously interfered with the work for a large part of the season.

Professor Strong obtained a considerable amount of data concerning the location of many colonies of breeding herring gulls on the Great Lakes. He also studied the distribution and activities of the herring gull from the standpoint of one of the topics recommended by the committee on zoology of the National Research Council.

Miss Edith Priscilla Butler worked with Professor Strong on the reaction of gulls to sound stimuli. Some interesting data to be published later were obtained concerning the hearing of gulls. Observations were made on the docility of gulls and their capacity for learning.

Mr. E. L. Lambert and Miss Dorothy Cashen assisted Professor Strong in making records of the rate of growth of young birds. Mr. Roland Hussey worked with Professor Strong on the activities and distribution of birds in selected areas near the station. He visited these areas frequently and obtained important data correlated with weather and time conditions.

Mr. F. N. Blanchard, of the University of Michigan, collected data on the habitat and habits of the milk snake, and also did systematic work on this form. He made a determination of the Cicindelid fauna of the region, relative abundance of the species, the habitats of the adults and the habits of some of the more abundant species.

GEORGE R. LA RUE,
Director

SCIENTIFIC EVENTS

THE PROPOSED TRANSFER OF THE UNITED STATES NAVAL OBSERVATORY TO THE SMITHSONIAN INSTITUTION

SECRETARY DANIELS has sent the following letter to Chairman Padgett, of the House Committee on Naval Affairs:

My Dear Mr. Padgett: The Navy Department wishes to express most emphatically its disapproval of H. R. 10954 to change the name of the United States Naval Observatory and to transfer the same to the Smithsonian Institution.

The United States Naval Observatory has grown to its present proportions and position in the astronomical world through the efforts and under the control of the Navy and this department believes that its continued efficiency can best be maintained by retaining the present organization.

Any interference in the work of the observatory at this time when all are engaged in war work in addition to regular routine duties interrupts the supply of nautical instruments to the active fleet which may cause disaster.

The work done to keep up the supply of chronometers, sextants, compasses and other necessary instruments is more or less confidential and it is advisable not to put it in this communication, but it will be furnished in a verbal report if desired.

In addition to its work for the Navy, the observatory has the custody of sextants and chronometers purchased by the Shipping Board.

In March, 1909, the Secretary of the Navy issued an order establishing an astronomical council and stated, "The astronomical work of the Naval Observatory shall be so planned and executed as best to subserve the following purposes and no others, to wit:

"To furnish to the Nautical Almanac Office, as far as may be possible, such observations and such data as may be needed for carrying out the purpose of the law under which the appropriations for that office are made from year to year, which is as follows:

"'For . . . preparing for publication the American Ephemeris and Nautical Almanac and improving the tables of the planets, moon and stars . . .'

"The principal work of the observatory shall be in the field of the astronomy of position as distinguished from astrophysical work, and shall be the continued maintenance of observations for absolute positions of the fundamental stars and of stars which are to be made fundamental, and in addition the independent determination by observations of the sun, of the positions of the stars, moon and planets with reference to the equator and equinoxes.

"TRUMAN H. NEWBERRY,
"Secretary"

The duties of the institution have been so arranged that it is believed entirely satisfactory results have been attained, while the operations move with a common purpose known to the entire staff. The council has held its regular meetings and special meetings for the consideration of matters requiring prompt action.

The Naval Observatory consists of an astronomical department for securing the most accurate positions of the heavenly bodies possible; a nautical department in which are tested and repaired navigational instruments for the Navy; an office for the preparation of a nautical almanac by which the ships ascertain their positions at sea; a time service by which the operation of all railroads, ships and commercial bodies are furnished accurate time daily; a compass office in which the latest form of compasses are examined, as well as a means to show the younger naval officers the latest improvements in them; an inspection department, with inspectors at New York, Boston and San Francisco, under direct supervision of the observatory. These inspectors are on duty at the factories of manufacturers engaged in the production of navigational material for the Navy and United States Shipping Board. There is not another national observatory in any country that has all these departments combined under one head and carried on in one plant. Therefore, when this question of expense arises and comparisons are made, those separate departments should be combined to get the true cost.

A few of the complimentary notices from competent authorities are appended.

GIFT TO THE RED CROSS FOR MEDICAL RESEARCH IN FRANCE

THE Atlantic Division of the American Red Cross has announced that hereafter all expenditures for vivisection would come from a fund which had been contributed by an individual. The announcement, which came here from Harvey D. Gibson, general manager of the Red Cross in Washington, said that this fund also would be used to reimburse the treasury of the organization for money already spent in experiments on living animals. Mr. Gibson's statement in part was as follows:

Considerable public and private criticism has been made of an appropriation of the American Red Cross in August, 1917, for medical research work in France, because partly involved in this work was experimentation upon living animals for the purpose of finding methods of prevention and remedies for new and strange diseases among soldiers. This appropriation was made at a time of emergency, upon the recommendation of army medical officers and of a number of eminent scientists in this country. Prompt action was necessary, and it seemed to officers of the Red Cross at the time that the use of money in this way was proper from the Red Cross point of view, for it would be difficult to imagine any more imperative duty upon the Red Cross than to seek for every means of prevention and remedy for sickness among soldiers.

The Red Cross did not, as has been stated, appropriate this money for abstract medical research and experimentation. It was to be used for the direct and immediate purpose of finding ways to prevent or cure wounds and sickness among American soldiers. It was strictly a war measure. It develops, however, that there are large numbers of earnest Red Cross members who have sincere convictions against the use of animals for discovery of remedies for sickness. We recognize that it should be an obligation of the Red Cross management to show deference to such honest conviction.

Realizing the situation, an individual has come forward and has offered to supply money necessary for this work so that none shall be taken from the general funds of the Red Cross. The fund provided will also be used to reimburse the Red Cross General Fund for any expenditures in connection therewith in the past. The War Council decided to accept this offer without in any way taking a position either for or against the question in controversy, but because they do not wish their acts to be considered to be in conflict with the sincere convictions of Red Cross members.

The New York *Times* says in an editorial article:

It will be with regret deeply tinged with indignation that all sane and reasonably enlightened people will hear of the decision by the heads of the Red Cross not to use for animal experimentation—often and almost always incorrectly called "vivisection"—the money hitherto appropriated by them for that purpose. The decision may mean avoiding the loss of a few contributions to the Red Cross funds, but it also means the triumph of vicious ignorance over common sense, and it will encourage to further efforts the members of the most detestable and not the least dangerous group of men and women to be found in the United States.

The campaign of the anti-vivisectionists is waged, now as always, with no other weapons than those of calumny and falsehood. They deliberately and persistently make the most abominable accusations against men who have done and are doing an enormous amount of successful work to mitigate human suffering and to save human life. Incidentally, these same workers are conferring like advantages on innumerable domestic animals, but let that pass. The immediate issue is that interference with animal experimentation just now decreases the safety of the men in our army and navy, makes impossible, so far as the interference is effective, the conquest of several terrible diseases to which the fighters for liberty are still exposed, and sets up the absurd claims of fanatic dgenerates against the well-demonstrated truths of medical science.

And the Red Cross cautiously says that it does not take sides for or against "vivisection"! Such caution is reprehensible—is utterly unworthy of that great and beneficent organization. It should take sides, standing for right and against wrong. The immediate profit of doing anything else or less will be dearly bought in future loss of both money and respect. Red Cross money, in the amount that was proposed, could not possibly have been better invested than in the establishment of a biological laboratory near the scene of war for the study of the maladies of soldiers which this sort of research has not yet conquered. It was weak, and worse than weak, for the Red Cross to heed the hysterical shrieks and the monstrous charges of venality and murder that came from a few people whom it strains charity to call deluded or insane.

THE JOINT INFORMATION BOARD ON MINERALS AND DERIVATIVES

FOR the purpose of systematizing the handling of official inquiries regarding minerals and mineral products the Joint Information Board on Minerals and Derivatives has been formed. This body, which will serve as a clearing house to secure the prompt preparation and transmittal of data from a single authoritative source without duplication effort, is composed of representatives from the various government bureaus, boards and departments interested.

The war has caused an increased demand by various officials for all available information regarding raw materials essential to the government, and this demand has caused a notable increase in the work and the personnel of those bureaus that had in the past been directly concerned in mineral investigations.

This joint board was created to coordinate the activities of all concerned. Its purpose in no wise curtails but supplements the existing activities; its function is to make the equipment and personnel of the various bodies concerned better known and more readily available to the other organizations and to bring about an even more effective operation.

Mr. Pope Yeatman, of the War Industries Board, Division of Raw Materials, is chairman of the Joint Information Board, and all inquiries should be addressed to Edson S. Bastin, Secretary Joint Information Board on Minerals and Derivatives, Room 5037, New Interior Building, Washington, D. C.

Following are the government departments and official organizations and names of representatives on the board:

War Department.—Bureau of Ordnance, Lieutenant Colonel R. P. Lamont, Sixth and B Streets NW.

Navy Department.—Bureau of Ordnance, Commander R. S. Holmes, Lieutenant Commander N. W. Pickering, New Interior Department Building.

War Industries Board.—Division of Raw Materials, L. L. Summers, Pope Yeatman (chairman Joint Information Board), Council of National Defense Building. Division of Statistics, F. G. Tryon, H. R. Aldrich; Commercial Economy Board, M. T. Copeland; Council of National Defense Building. Bureau of Investigations and Research, F. H. Macpherson, Council of National Defense Building.

Department of Agriculture.—Bureau of Plant Industry, K. F. Kellerman; Bureau of Soils, Frederick W. Brown; Bureau of Animal Industry, R. M. Chapin; Bureau of Chemistry, W. W. Skinner; Federal Insecticide and Fungicide Board, John K. Haywood.

Department of Commerce.—Bureau of Foreign and Domestic Commerce, C. D. Snow, assistant chief; Bureau of Standards, Henry D. Hubbard.

Treasury Department.—Bureau of the Mint, Frederick P. Dewey; Division of Customs, George W. Ashworth; Office of Internal Revenue, A. B. Adams.

Interior Department.—Geological Survey, Adson S. Bastin (secretary of Joint Information Board); Frank J. Katz, New Interior Department Build-

ing; Bureau of Mines, Harvey S. Mudd, New Interior Department Building.

U. S. Food Administration.—Division of Chemicals, Charles W. Merrill.

U. S. Fuel Administration.—Oil Division, Thomas Cox; Coal Division, C. E. Lesher, New Interior Department Building.

U. S. Shipping Board.—C. K. Leith, J. E. Spurr, New Interior Department Building.

War Trade Board.—Bureau of Research, S. H. Salomon, 1027 Vermont Avenue; Bureau of Imports, Lincoln Hutchinson, Bond Building; Bureau of Exports, S. C. Thompson, 1435 K Street NW.

U. S. Tariff Commission.—Guy C. Riddell, 1322 New York Avenue NW.

Department of State.—Consular Service, H. A. Havens.

U. S. National Museum.—Division of Mineral Technology, Chester G. Gilbert.

Federal Trade Commission.—C. C. Houghton, 921 Fifteenth Street NW.

National Research Council.—John Johnston, 1023 Sixteenth Street NW.; Section of Metallurgy, H. M. Howe, 1023 Sixteenth Street NW.; Division of Geology and Geography, John C. Merriam, 1023 Sixteenth Street NW.

Director General of Railroads.—Car Service Section, G. F. Richardson, Interstate Commerce Building.

PHYSICIANS FOR THE ARMY AND NAVY SERVICE

Dr. Franklin Martin, chairman of the committee on medicine of the advisory commission of the Council of National Defense, appeals for an increased enrollment of doctors for service as medical officers in the Army and Navy.

Surgeon-General Gorgas asks for 5,000 medical men for the Army with which to establish a reserve as fast as the 16,000 medical officers now in training and in uniform are ordered to France. While men between the ages of 25 and 45 are most desirable, the maximum age limit for medical officers is 55 years. Physicians are commissioned as first lieutenants, captains and majors. After acceptance of their commissions they are given a reasonable length of time in which to arrange their affairs before assignment to active duty.

An increased demand for naval medical officers has been created by the additional responsibility of the Navy in protecting ships engaged in the transportation of troops and supplies to Europe. The following letter from Surgeon-General Braisted is self-explanatory:

Washington, D. C., April 5, 1918.

Dr. Franklin Martin,
Council of National Defense.

My Dear Doctor: May I request the cooperation of the Council of National Defense in conveying to the medical profession the fact that the Medical Department of the Navy is urgently in need of additional medical officers? Anything that you can do to assist us in filling these needs will be greatly appreciated.

Thanking you in advance for this, as well as for your many acts of cooperation in the past, I am,

Very sincerely, yours,
W. C. Braisted,
Surgeon General, U. S. Navy

Two thousand medical officers are required to meet the demands for immediate expansion and to establish a reserve.

Application blanks may be obtained from the Surgeon General of the Army, the Surgeon General of the Navy, the Council of National Defense, or examining boards for medical officers located in all the large cities of the country.

SCIENTIFIC NOTES AND NEWS

Mr. Samuel Henshaw has been appointed director of the Harvard University Museum.

Dr. John Johnston, of the Geophysical Laboratory of the Carnegie Institution, has been appointed secretary of the National Research Council.

Dr. Stephen Smith has resigned as member of the New York State Board of Charities, an office which he has held for many years. Dr. Smith was ninety-five years of age on February 19.

Professor Russell H. Chittenden, director of the Scientific School of Yale University, Professor Graham Lusk, of the Cornell Medical School and Mr. John L. Simpson, of the United States Food Administration, have been representing the United States at the interallied food conference in Paris. The immediate purpose of the conference is to establish

a scientific rationing system whereby the individual will be enabled to make the greatest effort on the minimum amount of food.

LEAVE of absence for the remainder of the year has been granted by Harvard University to Louis C. Graton, professor of economic geology, to enable him to take charge of the work of the Copper Producers Committee in Washington.

MR. H. E. IVES, of the United Gas Improvement Company of Philadelphia, Pa., has entered the Science and Research Division of the Signal Corps.

DR. FREDERIC BONNET, JR., professor of chemistry at the Worcester Polytechnic Institute, has resigned to accept the position of chief chemist at the new Perryville plant of the Atlas Powder Company.

PROFESSOR ADOLPH F. MEYER, associate professor of hydraulic engineering of the University of Minnesota, has accepted a position as engineer for the Minnesota-Ontario Power company and will resign his position on the faculty probably at the end of the current year.

DR. W. F. FARAGHER has resigned his position as research chemist for the Alden Speare's Sons Co. to become senior fellow at the Mellon Institute in Pittsburgh. He will work on crude petroleum.

MISS KATHERINE MARDEN, assistant bacteriologist in the Massachusetts State Department of Health, has been appointed sanitary bacteriologist in the United States Public Health Service, and has been ordered to proceed to Greenville, S. C.

DR. ABRAHAM JABLONS, of the Bureau of Preventable Diseases, Department of Health, City of New York, is on active duty in the United States Naval Reserve Force, at the Naval Hospital, Brooklyn, New York.

THE Rockefeller Institute recently tendered a banquet to Dr. G. Gasteñeta, subdean of the medical department of the University of Lima, Peru, who has been on a brief visit to the United States.

THE Gill Memorial of the Royal Geographical Society has been awarded to Dr. Cuthbert Christy for his surveys and explorations in Central Africa.

THE *Journal of the American Medical Association* states that the seventieth birthday of the well-known authority on physiologic chemistry and histology, Professor C. A. Pekelharing, of the University of Utrecht, falls on July 18, and his friends and pupils are collecting a fund to erect a tablet in his honor or endow the laboratory for physiological chemistry there. The secretary of the committee in charge of the testimonial is Dr. C. J. van Hoogenhuyze, Banstraat 8, Amsterdam.

THE officers of the Royal Microscopical Society, elected for the ensuing year, are: *President,* J. E. Barnhard; *Vice-Presidents,* E. Heron-Allen, F. Martin Duncan, A. Earland and R. Paulson; *Secretaries,* Dr. J. W. H. Eyre and D. J. Scourfield.

THE Medical Research Committee of Great Britain has appointed a special committee to consider the methods of manufacture, biological testing, and clinical administration of salvarsan and its substitutes used in Great Britain, and the results of these, and to propose to the Medical Research Committee specific investigations aimed at improving those methods and results. The committee consists of Dr. H. D. Rolleston, C.B., temporary Surgeon-General R.N. (chairman), Professor F. W. Andrewes, M.D., F.R.S., Professor Wm. Bulloch, M.D., F.R.S., Dr. H. H. Dale, F.R.S., Lieut.-Colonel L. W. Harrison, D.S.O., R.A.-M.C., and Dr. F. J. H. Coutts, assistant medical officer, Local Government Board (secretary).

PROFESSOR FREDERICK B. LOOMIS, of Amherst College, recently addressed the Middletown Scientific Association at Wesleyan University on "The Patagonian Pampas." The subject matter of this lecture was taken from facts gathered during five months' traveling over the Pampas, while hunting for extinct animals.

THE Cutter lectures on preventive medicine and hygiene will be delivered at the Harvard

Medical School from 5 to 6 P.M. on April 25 and 26, by Frederic S. Lee, A.M., Ph.D., professor of physiology of the College of Physicians and Surgeons, Columbia University, on "Industrial Efficiency and the War."

Dr. W. Eagle Clarke, keeper of the Natural History Department of the Royal Scottish Museum, Edinburgh, has been elected president of the British Ornithologists' Union, in succession to Col. Wardlaw Ramsey.

In view of a biography of the late Percival Lowell, it is requested that any one possessing letters of his will be kind enough to lend them to G. R. Agassiz, 14 Ashburton Place, Boston, Mass. All letters lent will be promptly copied and returned.

Professor Ewald Hering, the eminent physiologist, professor at Leipzig, has died at the age of eighty-four years.

There is announced in *Nature* the death of Miss B. Lindsay, on December 16 last, at Onchan, Isle of Man. She was known for her experimental work in the morphology of birds and molluscs and for her text-books.

Professor G. Meslin, director of the physical institute laboratory of the University of Montpellier, known for his work on optics, died on January 11, aged fifty-six years.

There is need for about 100 women bacteriologists to take the place of men in the cantonment laboratories, the Surgeon General's Office of the United States Army announces. The service of the men is demanded for the hospital units which are going abroad and their places at the home cantonments are to be filled by women. Applications are arriving from all camps, some asking for as many as nine women. A good practical knowledge of clinical pathology and diagnostic bacteriology is required for the work. The present salary is $720 with maintenance and $1,200 without, with transportation furnished by the government. Applications may be made to Office of the Surgeon General, Washington, D. C.

The United States Civil Service Commission announces an examination for apprentice draftsman, for males only, to fill vacancies in the Coast and Geodetic Survey. The entrance salary will be at the rate of $60 a month during the time of probationary service of six months, with subsistence at the rate of $1 a day when serving on shipboard or in camp, and $2 a day when living on shore and boarding. Those serving a satisfactory probationary period of six months will be appointed draftsmen at $900 a year and will be eligible for appointment to one of the statutory positions in the drafting section of the Coast and Geodetic Survey at Washington, D. C., after passing the examination for topographic draftsman. On entering the service, apprentice draftsman will be given special instruction in the office at Washington, D. C., for two or more months, and then will be ordered for duty with a field party. In the field they will be given elementary instruction in the several branches of surveying and afforded an opportunity of becoming familiar with survey methods by taking part in the different classes of field work. At the close of the field season they will be ordered to the office at Washington, D. C., where they will be engaged in completing the records of the past season's work and at the same time they will be given special instructions to fit them for more advanced cartographic work.

The next annual session of the Biological Laboratory at Cold Spring Harbor, Long Island, New York, will be held during June to September. Class work will begin Wednesday, July third and continue for six weeks. Courses of instruction are offered in field zoology by Drs. Walter and Kornhauser, bird study by Mrs. Walter, comparative anatomy by Professor Pratt, sanitary entomology by Mrs. Elizabeth H. Wright and others, animal bionomics and evolution by Dr. Davenport, systematic and field botany by Dr. John W. Harshberger, a training course for field workers in eugenics by Drs. Davenport and Laughlin. Advanced work in zoology and botany is offered by the staff. Professor and Mrs. H. H. Wilder also offer a course of lectures and laboratory work on physical anthropology. This last course and the course on sanitary entomology and the elementary course in botany are this

year adapted to war conditions. Announcement and further information can be obtained by addressing C. B. Davenport, Cold Spring Harbor, New York.

THE meeting of the British Association, which it was hoped would be held in Cardiff this year, has been cancelled. The local committee has reluctantly decided that satisfactory arrangements could not be made to ensure success for the meeting, and has sent a resolution to that effect to the council of the association. The council has accepted this view, so that for two years in succession the annual assembly of workers in all departments of science will not take place. Sir Arthur Evans has consented to occupy the office of president for another year, and there will be a statutory meeting in London on July 5 to receive reports of committees and transact other business, but otherwise the corporate life of the association will continue in a state of suspended animation, though there never has been a more favorable time than now to make the nation realize the debt it owes to science for the successful conduct of the war and the need for unceasing scientific activity to prepare for the industrial struggle which the future must bring.

UNIVERSITY AND EDUCATIONAL NEWS

SIR WILLIAM SCHLICH, F.R.S., professor of forestry in Oxford University, has received £500 from a donor who wishes to remain anonymous, to be added to the fund for the permanent endowment of the professorship of forestry. With the sums already contributed, the capital of the fund now amounts to over £6,300, and the annual income from all sources to about £300 a year, making about half of what is required.

A COMMITTEE, of which Sir William Osler is chairman, met in Cardiff recently to prepare a scheme for the Mansel-Talbot chair of preventive medicine in the University of Wales endowed by Miss Talbot. When the scheme had been approved the election of a professor will be proceeded with.

PRESIDENT BENJAMIN IDE WHEELER, of the University of California, has again asked for an increase in salaries for members of the California faculty. A year ago men of the grade of instructor and assistant professor received an increase of ten per cent.

JULIAN L. COOLIDGE, assistant professor of mathematics at Harvard University, has been advanced to a full professorship.

AT the Pennsylvania State College, E. H. Dusham has been promoted to be professor of entomology; M. D. Leonard, instructor in entomology at Cornell University, has been appointed instructor in entomology extension and R. C. Walton, of the Ohio Experiment Station, instructor in plant pathology.

DR. KIRTLEY F. MATHER, professor of paleontology at Queen's University, Kingston, Canada, is acting professor of geology and geography at Denison University, Granville, Ohio, for the spring term.

DISCUSSION AND CORRESPONDENCE

THE EXISTENCE OF LECITHIN

SOME eight years ago and again very recently, Barbieri[1] has reported results of experiments which he claims proves the non-existence of lecithin. His arguments are the following:

> The fatty matter of egg yolk can be separated in a state of purity by the aid of neutral solvents. The nitrogen-containing bodies can be removed by simple dialysis or by repeated washing with distilled water in the presence of a little alcohol. The fat yields on hydrolysis nothing but glycerol and fatty acids. Glycerolphosphoric acid can not be obtained by treating the egg yolk with a neutral solvent. It appears only after hydrolysis. The phosphorus occurs only in the form of metallic (potassium, sodium, calcium or magnesium) salts of phosphoric acid and is entirely dialyzable. Egg yolk contains no trace of choline, the supposed biological choline being a product of either the degradation of the ovochromin or of putrefaction.

From these results it would appear that the compound ordinarily called lecithin is a mixture of fats, phosphates and dialyzable nitro-

[1] Barbieri, N. A., *Comp. rend.*, 1910, 151, 405; *Gaz.*, 1917, 47, 1–13; *J. Chem. Soc.*, 112, I., 238.

genous substances. Such a mixture should be capable of some separation by ordinary chemical means. Any method of rigorous purification, such as that employed in the purification of lipoids, would certainly effect some change in the composition of this mixture.

Without criticizing the arguments of Barbieri, some of which (*e. g.*, the statement that glycerolphosphoric acid may be formed during the process of hydrolysis, from the glycerol of the fat and dilute phosphoric acid) certainly are open to criticism, we offer the following argument for the existence of lecithin.

The work of earlier workers seems to be sufficient to show that lecithin is a chemical substance, even though the analyses of the products from various sources (brains, heart, liver, egg) did not agree very well. But if any doubt existed as regards the existence of lecithin, it would seem that the recent work of Levene and West[2] proves that such an idea is not tenable. Not only has lecithin, as such, been isolated from the above-mentioned sources, but derivatives have been prepared and subjected to rigorous purification, always with the same result. The following facts may be mentioned.

Lecithin, from various sources, such as the primary alcoholic extract, the primary ethereal extract, the secondary alcoholic extract, or the fraction dissolved in egg oil, has been precipitated as the cadmium chloride salt, giving a product of very similar composition. This salt has been purified by crystallization from two parts ethyl acetate and one part 80 per cent. ethyl alcohol, or by extraction with ether and subsequent crystallization, with little or no change in its composition. Furthermore, the salt may be decomposed with ammonium carbonate (Bergell) and the free lecithin again converted into its cadmium chloride salt; this salt will still have the same elementary composition.

A more convincing proof of the chemical individuality of lecithin is found in the preparation of hydro-lecithin. Lecithin (especially those samples which have been washed with water and acetone, according to the directions of MacLean) is very readily reduced with hydrogen (using Paal's method, with colloidal palladium as the catalyzer) and yields a crystalline tetrahydrolecithin, which may be obtained in an analytically pure form by crystallization from methyl ethyl ketone, and once pure, may be recrystallized repeatedly, without change in composition, from such solvents as methyl ethyl ketone, alcohol, or ethyl acetate. If, as Barbieri claims, fats are present, they would remain in the methyl ethyl ketone liquors; our experience in the purification of cerebrosides indicates that this is one of the best solvents for the removal of fat.

We have also combined these two processes. Lecithin has been precipitated from alcoholic solution by cadmium chloride, the salt decomposed with ammonium carbonate, the free lecithin washed with water and acetone, and then reduced with hydrogen. In this way Levene and West have obtained a chemically pure tetrahydrolecithin.

It is hard to believe that a mixture of choline, glycerides, and phosphates, such as Barbieri claims for lecithin, can be subjected to the above methods of treatment and give, in every instance, a body with identical chemical composition. Rather, I believe, it is easier to accept the chemical individuality of lecithin.

Clarence J. West
Washington, D. C.

[2] Levene, P. A., and West, C. J., *J. Biol. Chem.*, 1918, 33, 111; 34 (in press).

DESMOGNATHUS FUSCUS [SIC]

Full many a biologist, in his use of the classics, has encountered two special stumbling-blocks; the fourth Latin declension, and the Greek noun whose gender does not fit its form.

Concerning the first of these, so many anatomical nouns, among them certain of the most commonly used ones, belong to this weak form of declension that the student of anatomy may almost consider the fourth the commonest one for masculines in *-us*. He meets with *ductus, arcus, fetus, plexus,* and *nexus;* with *processus, recessus, meatus, tractus,* and *sinus,* while the five senses, with *sensus* itself, are

all of the fourth declension; *visus, auditus, gustus, olfactus,* and *tactus.* Awkward as is any plural form of these words in English, the anatomist has to come to it, and speak of "arcuses, ductuses, and fetuses," or else appear to talk bad Latin, and repeat the singular form.

The mistaking of an unusual gender, such as a Greek masculine of the first declension, or a Greek feminine of the second, is still easier, as here the erroneous form sounds to us right, and the correct form incorrect. It takes a bold man indeed to speak of *Erigeron bellidifolius* or *Plethodon glutinosus,* where the masculine form used for the genus looks like a neuter, and it seems to us still more unnatural to say *Desmognathus fusca,* instead of the (to us) more natural *fuscus.* Unfortunately this mistake was made at the original naming of this species by Spencer F. Baird in January, 1850, and this initial mistake was followed by several illustrious men, both anatomists and systematists, among others by Wiedersheim (1887), W. K. Parker (1879), Boulenger (1882), and as late as 1909, by Gadow. On the other hand the correct form *fusca* was used by Cope (1889), by the later systematists, G. M. Allen, Fowler and Dunn, and in the anatomical and embryological writings of Kingsbury, Hilton, Mrs. Seelye, Mrs. Wilder, H. H. Wilder and others. Moore, in describing his new Salamander, *Leurognathus marmorata,* used the correct feminine form for the specific name, as did also Dunn in his new sub-species of *Desmognathus, ochrophaea carolinesis.* Since now, practically all the writings of the last decade have corrected the old errors, and restored *Desmognathus* to its proper gender, it is a great pity that in the new (1917) check list of Reptiles and Amphibians by Stejneger and Barbour, the old erroneous masculine form is brought back again, and we find *Desmognathus fuscus* in all its shame. And, in addition to this, come all the other *Desmognathoe; ochrophaea, quadrimaculata* (or, following the original error, *quadramaculata*), and the sub-species *auriculata,* all changed, to the masculine like the maiden Coenis of the poet Ovid, appearing in the form of nondescript gynandromorphs! Let us hope that, unlike this changeable person, the species thus transmuted will not become invulnerable.

But, having once, in flat defiance of Homer, Herodotus, and every other Greek writer from Hesiod to Eleutherios Venizelos, changed the grammatical gender of the noun γνάθος it becomes necessary to change also the specific name of Moore's *Leurognathus,* which, instead of appearing as Moore originally gave it (1899), as *Leurognathus marmorata,* is also masculinized as *Leurognathus marmoratus.*

Still more unfortunate are the mistakes in quoting both Moore and Dunn, the former being quoted as having originally used the form in *-us,* which he did not, and the latter, as having written *ochrophaeus carolinesis,* whereas he was most careful to use the feminine in *-a.* Altogether it is a bad mix-up, and being in a check-list, which will be used as an authority for years to come, it may actually foist this glaring solecism upon American herpetologists beyond the power of correction.

Mark Twain, in his rules for improving the German language, suggests the reconstruction of their genders in accordance with the plan of the Creator, "as a tribute of respect if nothing else." In the correction of "*Desmognathus fuscus*" we have a chance to show some respect to the Greek language.

Harris Hawthorne Wilder

A MOLLUSCAN GARDEN PEST

In a previous number of Science[1] the writer called attention to the presence of a slug (*Agriolimax agrestis* Linn.) in gardens which was doing considerable damage to such vegetables as cauliflower, lettuce and potatoes. During the past summer (1917) and early fall this slug has become much more troublesome and in some localities has caused considerable damage.

At Brewerton, N. Y., it was observed eating cabbages and potatoes; in Syracuse it has attacked potatoes, causing a large amount of injury in several fields and gardens. The writer

[1] Science, N. S., Vol. XLIII., p. 136, 1916.

has taken occasion to question several persons who had made gardens in vacant lots and in fields near the city and in all cases the slug was reported to have been present in numbers sufficient to cause appreciable damage. In one garden the slugs had eaten into the tubers to such an extent as to destroy two thirds of the potato. Several slugs were found in a single potato and associated with them were many wire worms (probably larvæ of the beetle *Agriotes mancus* Say) and sowbugs (isopods). The wire worms have been reported as very abundant in potatoes, both in Syracuse and in Rochester, N. Y. Damage from the slug has been reported from Rochester, Canandaigua and Geneva.

It is evident that this slug is becoming a troublesome pest in garden truck farms and small gardens and a problem arises as to the best means of combating its ravages. It can be controlled when its depredations are confined to the surface plants by spreading fine ashes about the plants, which cause the animal to exhaust itself by the copious flow of mucus, induced by the irritant action of the ashes. But this will not affect those individuals that enter the ground and attack the tuber below the surface. It has been suggested that if the grass surrounding the garden patch be kept short it will prevent the slugs from hiding near the garden during the day, the active time of the species being at night. The placing of boards about the garden will also act as a trap, the slugs retiring beneath these boards during the day when they may be collected and killed.

This slug is one of the commonest snails in western New York. In many parts of Syracuse it is abundant after rains, crawling over the sidewalks, leaving behind it a slimy, glistening trail. Its tendency to adopt the products of the garden for food in place of its natural food indicates that it must be classed among the agencies injurious to farm and garden products.

It may be of interest to note that a related species of slug (*Agriolimax campestris* Binney) has been observed[2] to eat plant lice (*Phorodon mahaleb* Fousc.) in considerable quantity. Under these circumstances it would be placed among beneficial animals. Observations on the natural food of these small slugs would be of interest and value.

[2] F. M. Webster, Bull. 68, Ohio Agric. Exp. Station, pp. 53–54, 1896.

Frank Collins Baker
New York State College of Forestry,
Syracuse University

THE YELLOW CLOTHES MOTH

Since my note on the yellow clothes moth was published, I have learned with regret that I overlooked a record of original observations on this species by Professor Glenn W. Herrick, published in 1915, in his "Insects Injurious to the Household." It is a matter of interest that the two accounts agree almost exactly with respect to the details treated in common.

Professor Herrick had already noted the common distribution of *Tineola* as compared with *Tinea,* the number of eggs laid (one individual), the appearance of the egg, the hatching period, the approximate pupal period, and the fact that the first brood for each year must be mainly derived from eggs of the preceding year.

In regard to the latter point, it may be added that, while as already noted, moths may emerge in every month of the year, there are two periods of much greater abundance. The first begins about the end of April in New York City and lasts through June. With the estimated minimum growth stage of ten weeks, it is unlikely that any of this first brood represent eggs of the same year. During the summer, the flying stage was common enough but nothing like that of the preceding months. In late August again and through September there was another period of abundance, the result undoubtedly of the development of the eggs of the first large brood of moths. Figuring from the whole season it would appear a safe conclusion that the average period of active larval growth is about three months. The actual growth periods, including the winter season, are approximately three and one half months (June–September 15), and eight and one half months (Sept. 15–June).

R. C. Benedict

THE AURORA OF MARCH 7

TO THE EDITOR OF SCIENCE: as a matter of record it may be worth while, even at this late date, to note that the aurora of March 7 was seen in Winter Park, Florida (latitude about 28° 37′). It was visible for a short time only, between 9:30 and 10:00, Central Standard time. Those who saw it described the sky as brilliantly red for perhaps forty degrees along the northern horizon, with streamers extending half way to the zenith.

FRANK P. WHITMAN

WINTER PARK, FLA.,
April 5, 1918

SCIENTIFIC BOOKS

Principes de Géométrie Analytique. Par GASTON DARBOUX. Gauthier-Villars et Cie 1917. Pp. vi + 517.

This important work has elements of interest extending beyond the circle of the professional mathematicians. It was the last mathematical contribution of one of the most noted French scientists and constituted the subject matter of his last course of lectures at the Sorbonne, closing a very successful teaching career which extended over a period of more than fifty years.

The principles of analytic geometry treated in this work relate mainly to the imaginary and the infinite in algebraic geometry, and hence they are also of great philosophic interest. In his Introduction the author states that these principles are too much neglected at the present time, being usually treated in the elementary courses where they can not be developed with the completeness which they merit and which he is free to give them here.

In our American text-books these principles are commonly omitted altogether. Comparatively few students become familiar with such interesting properties as those exhibited, for instance, by the two lines whose equation in rectangular coordinates is $x^2 + y^2 = 0$. Each of these two lines is perpendicular to itself and has the property that the distance between any two of its points corresponding to finite coordinates is zero.

Our students of analytic geometry meet such equations as $x^2 + y^2 + 1 = 0$, which are not satisfied by the coordinates of any real point. They are usually told that these equations represent imaginary curves, but if they consult some more advanced works; *e. g.*, the *Encyclopédie des Sciences Mathématiques* tome III., volume 3, page 260, they find that what they commonly called imaginary circles and imaginary ellipses in their courses in analytic geometry are here called *real* curves. A *real* curve being one whose equation has real coefficients and hence does not need to contain any real point according to these authorities.

These remarks may serve to exhibit the facts that the imaginary in analytic geometry presents views which are quite different from those obtained by the student who confines himself to the consideration of real points, and that authorities do not agree as regards the definition of a real curve when the degree of the curve exceeds unity. Moreover, it is only necessary to recall the two circular points at infinity, which lie on all the circles of the plane, in order to remind ourselves of the fact that infinity also presents matters of interest which escape those who deal only with the finite region.

The volume under review is divided into five books with the following headings: anharmonic ratio, metric definitions, the theorems of Poncelet, Cayleyan geometry, and inversion. It has much in common with a work published by the same author under the title: "*Sur une classe remarquable de courbes et de surfaces,*" 1872, but it contains many later developments. In particular, the part on Cayleyan geometry was developed by the author, according to the preface, during the years 1895 and 1896.

The book is not intended for the beginner in analytic geometry but presupposes some knowledge of this subject. Its chief aim seems to be to lay a solid foundation for the study of the imaginary and the infinite in geometry, and to present the subject in an attractive and simple manner with a view

to securing a wider interest in this extensive field. No other man could have brought a wider knowledge or a more skillful hand to this noble task and the accomplished work is a credit to its author and to his country.

G. A. Miller

University of Illinois

Additional Studies in the Pleistocene at Vero, Florida. Pages 17–82, 141–143, from the Ninth Annual Report of the Florida State Geological Survey, 1917.

The pamphlet, just arrived, comprises five articles of particular interest to anthropologists: one by Professor E. W. Berry, of Johns Hopkins University, on Fossil Plants; one by Dr. R. W. Schufeldt on Fossil Birds; one by Dr. O. P. Hay, of the Carnegie Institution, on Fossil Vertebrates; and a final paper (with a supplement) by Dr. E. H. Sellards, state geologist of Florida, summing up the evidence and the discussion to date with reference to the antiquity of the associated human remains. The three special papers, it should be noted, are concerned mainly with data from stratum No. 3, *i. e.,* the top formation in and at the base of which most of the human remains occur. Of the organic forms found here those either totally or locally extinct are given approximately as follows: mollusks 0 per cent., turtles 50 per cent., birds 33 per cent., mammals 40 per cent., and plants 20 per cent. Dr. Sellards deems this record consistent and after affirming that the exposed Vero section shows "distinct uninterrupted lines of stratification beneath which human materials are found," pens his conclusions in these words: "The human remains and artifacts are contemporaneous with extinct species of mammals, birds, reptiles, and at least one extinct species of plants, as well as with other animal and plant species that do not at the present time extend their range into Florida. The age of the deposits containing these fossils according to the accepted interpretation of faunas and floras is Pleistocene."

The full significance of these remarks is of more than ordinary importance. With the findings of specialists in the fields of geology and paleo-biology no anthropologist will be disposed readily to take issue; and the writer in particular, having spent only a few hours at Vero, is in no position to challenge directly any of the alleged facts; but he ventures, nevertheless, to offer some remarks having general bearing on the situation as now developed.

In the first place, anthropological literature records a score or more of isolated archeological discoveries (Dr. Hay cites some of them) which, because of attending circumstances, have by some been adjudged proofs of extraordinary human antiquity and which thus lend substantial support to the appearances at Vero. Many of these discoveries, like the one before us, are of the *bona fide* sort, requiring no affidavits, and they range from the Tertiary gravels of California to the glacial deposits of New Jersey. Nevertheless, whatever the merits of these data, they have not been generally accepted because their acceptance, in view partly of the known conditions of paleolithic Europe, involved tremendous difficulties in the way of assumptions rather than doing away with them. At the same time it can not be doubted that these very finds have directly inspired many students to the investigation of artificially stratified deposits, both in caverns and elsewhere with a view, if possible, to obtaining supporting evidence that would ultimately result in the credibility of these isolated and questionable discoveries. Now, up to the present time, although this indirect effort has been continued for more than a generation and has ranged geographically from Alaska to Patagonia, nothing satisfactory has come of it. Within the United States alone, both cave and mound deposits have repeatedly been shown to record a considerable range in cultural development, but the associated faunal remains of even the oldest strata have never yielded any but modern species; and this, so far as the published data goes, is true also for the shell mounds of Florida. Under those circumstances no archeologist can be expected to relinquish at once his scepticism concerning the Vero discovery.

In the second place, anthropological investigations go to show that of the fundamental primitive arts, pottery-making, for various obvious reasons, is of relatively late date in culture history, throughout the world. The archeology of the eastern United States seems particularly clear on this point. Thus, it has been demonstrated over and over again that the lower strata of artificial deposits from the Ozark uplift to the Atlantic coast and from lower New York state to Florida are devoid of ceramics. Narrowing the field to the east coast of Florida, we have on record several independent determinations (one by the writer only last spring and not yet published) to the effect that the shellmound people did not at first possess any pottery at all, that after a time they began making a plain dull-reddish earthenware, and that finally, some time before the arrival of European explorers, they took to ornamenting this ware by impressing upon it some simple geometric patterns.

Now pottery fragments, apparently of the undecorated variety, occur also in the Vero deposit, and the archeologist, rather than accepting an extraordinary hiatus in his own data, will be disposed to consider the section in which it was found to be synchronous with the middle period of the local shellmound occupation. To accept the Vero date at its present face value would compel him not only to relegate the development of pottery to an unheard of date but also it would oblige him to assume that this early culture of Pleistocene times was snuffed out and that after some milleniums marked by the arrival of the modern fauna a new and lower type of culture became established which only after a very considerable period reached the level of the original culture. Such a happening is conceivable, but it is not plausible.

So far as the writer can see, the archeologists can do very little more than they have done already toward the solution of the Vero problem. Extended investigation by an archeologist would in all probability yield nothing, because on the real points at issue he would always have to defer to the geologist and the paleontologist. If we could persuade the paleontologist to satisfy himself about the fauna of the shellheaps something might result. Errors of identification may have been made in the past. If he can close the gap between the shellmound fauna and that of the Vero section nobody will be happier than the passing generation of archeologists. But even then the complete solution will not have been reached because we shall still be facing a situation which appears to require one of two things: either the anthropologist must surrender not only his present lightly held opinion regarding the antiquity of man in America, but also his rather more firmly fixed notion regarding the order and progress of cultural traits in general, or else the paleontologist must concede us a very much narrower margin of time as having elapsed since the close of the Pleistocene than he has hitherto.

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SPECIAL ARTICLES

A NEW METHOD FOR INVESTIGATION OF THE PERIPHERAL NERVOUS SYSTEM, MUSCLES AND GLANDS

IN preparing and preserving animals for investigation of the gross anatomy of the peripheral nervous system, muscles and glands, simple methods commonly in use have not proven very satisfactory.

For the study of anatomical structures alcohol does not differentiate sufficiently either to separate the parts from each other or from surrounding tissues. Aside from its cost, moreover, alcohol is open to the objection that it makes the parts brittle. Formalin has been used with better results and is now the standard means employed in preparing, and particularly in preserving, portions of the central nervous system. While both these reagents are preservatives of the peripheral nerves, muscles, and glands, neither is a satisfactory preparative for their dissection.

A successful fluid for this purpose should not only preserve, but it should also differentiate the anatomical systems from each other and bring to view the constituents of the

parts studied, with their relations to the other parts, without disturbing the natural mobility of the tissues as a whole. Such a fluid should reduce the work of dissection so that a minimum of disturbance is necessary in order to reach the parts under investigation.

A most serious objection to formalin is the adhesive effect it has upon tissues, so that parts are not readily separable. Muscles are stuck together in a more or less brittle or fused mass and the nice mobility of tissues observable in a fresh specimen is wholly destroyed. Resultant color changes, too, are such as to make dissection more difficult, for muscles are altered from their characteristic reddish to whitish tints, and it is consequently impossible or exceedingly difficult to trace the smaller nerves to regions of their ultimate distribution.

Formalin adds to, rather than subtracts from, the amount of dissection required, on account of the care necessary in avoiding severance of parts to be left intact.

After giving formalin a thorough trial as an aid for studying the peripheral nervous system it was discarded altogether and the use of fresh specimens employed as a substitute method. But while fresh material is much easier to work upon, the finer nerves are even less distinct than they are after the use of formalin. Moreover, fresh tissues soon begin to deteriorate and the animals become unfit for further use. Pieces of ice kept constantly near, or upon, the material were then tried, with some improvement. Although the animals can be kept for a period of three weeks by resorting to the ice chest, the dissections are not satisfactory. The reason for this is, not only because too much mechanical effort is necessary to segregate the parts, but also because the smaller nerves are not brought clearly to view.

A temporary preservative, and, what is of much more importance, an almost ideal preparative, for the investigation of the peripheral nervous system, muscles and glands, is found in hydrochloric acid.

The fresh animals may be first put in a 5 per cent. solution of *hydrochloric acid ice-water* and left for twenty-four hours. They may be skinned or not, as the problem in hand requires, but the body and chest cavities should in any case be opened to allow the fluid to penetrate through the tissues.

In preparing specimens for work on the cutaneous nerves it is necessary, of course, to leave undisturbed whatever portions of skin are to be studied; otherwise, it is best to remove the entire skin.

After treatment with hydrochloric acid the animals are washed in the coldest water obtainable from the faucet, and put in receptacles deep enough so that the material can be kept covered with ice-water or at least cold water. These receptacles are then stored in the refrigerator when the specimens are not in use.

In using animals so prepared it is found practical to wash them first in running water, leaving the pan partly filled, and then to add pieces of ice sufficient to surround the specimen while observation and dissection are going on. In tracing the smaller nerve divisions, details are brought out better if, occasionally, dilute acid is added, by means of a pipette, directly to the parts under consideration, since by this treatment the transparency of the muscle fibers is increased.

Guinea pigs treated by the above method were found to be in excellent condition for following medullated nerve fibers far into the tissues which they supply.

The 5 per cent. acid solution increases the whiteness of the nerves bringing them into sharp contrast with the natural reddish, or reddish-brown, back-ground of muscles, but if much stronger acids are used, even 10 per cent., it tends to whiten the muscles and dissolve the fibers without improving the color of the nerves.

Animals are also put in good condition for dissection if treated with a 6 per cent. acid solution. If a specimen is to be used during a long period it is better to give an initial twenty-four hour treatment in an acid solution not stronger than 3 per cent. and subsequent immersions in the same strength of acid for shorter periods. In any case the water left

upon the specimen while it is being kept in the refrigerator should be changed at least once a day.

However, the percentage of acid below 6 per cent. may be varied considerably. Indeed, 3 parts of acid to 1,300 parts of water has been found to bring to distinct view cutaneous and other nerves lying near the surface, if the animal is left in the solution three or four days. Interior parts, as the muscles of the eye, then appear reddish, but may be made almost transparent by addition of dilute acid directly to the dissected part as the head lies covered with cold water in the dissecting pan.

Doubtless several factors are involved, in deciding strength of acid to be used. Chief of these is the *size* of the animal, the *nature* of the tissue and the *location* of parts to be studied.

The use of this acid method for investigating the anatomy of various animals, together with the best means of preserving them over long periods, is under investigation and will be treated in a future paper.

In the 5 per cent solution muscles are not only separated from each other but the fiber bundles, of which they are composed, are brought out distinctly, by the breaking down of connective tissue between them. The entire muscle thus made more or less transparent, allows its smaller nerves to appear.

An excellent illustration of the advantage of this transparency was found in the case of the *orbicularis oculi.* After treatment in the acid solution, following the removal of the skin peripheral to the eyelids, little further dissection was needed for study. The orbital and palpebral portions of the muscle, their constituent fibers, with the ramifications and anastomoses of motor and sensory nerves within them, were distinctly observable throughout the breadth and depth of the muscle.

The effect on the muscles of the body wall is such as so to separate the constituent parts and so increase their transparency that the smaller divisions of the nerves within the muscle can be observed at various depths.

Action of the acid seems to continue after removal of the specimen from the solution. In the preliminary treatment, the blood vessels are easily followed and veins can be distinguished from arteries, while anastomoses of blood vessels upon the walls of the alimentary tract, for instance, are brought out clearly. But, as the action of the fluid (5 per cent. HCl) continues for some days, red corpuscles are gradually dissolved and the smaller vessels become less clearly discernible. After a week or so, the inner lining of the stomach wall is loosened from the outer layers of muscle and the latter is broken up into its longitudinal, circular and oblique fibers. Later stages of treatment show clearly the interlacing of the muscle fibers of the heart.

The skeletal parts are found, on removal from 5 per cent. acid, to be decalcified sufficiently to yield readily to cutting with scissors or breaking with forceps, so that the dissection of nerves where they pass through bony channels is rendered easy. On the whole the tissues are broken down so very gradually that a single specimen can be used for weeks.

The most fortunate feature of the method lies in the fact that connective tissue is the first to be seriously attacked by the acid. Much of it remains even to the later stages of dissolution, but appears less dense while its strands become so weak that it is readily separable from parts which it holds together. Nerves and muscles, on the other hand, are about the last of the soft parts to be broken down.

Small unmedullated sympathetic fibers, however, are not favorably affected for dissection by this method and consequently are not as easily traceable as are medullated fibers. That sympathetic fibers are not dissolved by the solution is certain, since the larger ones, and even a few of the smaller ones related to the blood vessels in the orbit, can be traced with accuracy for some distance. This method, therefore, cannot be recommended for study of the sympathetic system, other than of its grosser parts. In such investigations it is decidedly useful, in locating all the larger

ganglia in the body cavity and elsewhere, together with many of their gross connections.

This method has also been proved to be of advantage in the study of glands. Here, again, the breaking down of connective tissue seems to be the chief factor. Glands are thus separated from other organs, the outlines of their lobes come into view, ducts are released from their envelopes and the nerve supply, wherever medullated, can be easily traced. In the study of glands the color effects from this treatment, as in the case of nerves, are helpful to investigation.

It is apparent that a readily applied anatomical method which brings parts to distinct view with little or no dissection is of wide usefulness in embryology. A statement by Professor Mead of the applicability of this method to pig embryos will be found below.

One of the greatest advantages of the method, whether applied to nerves, muscles or glands, is finally to be mentioned, namely, it permits the use of the camera lucida for drawing. It has been found entirely practicable to mount a camera lucida (Abbé type) over the right eye-piece of a binocular microscope and to reduce the field of the left eye-piece by a superposed cylinder 1.8 cm. long, the upper aperture of which is 3 mm. in diameter. This arrangement prevents the observer from shifting the eye to a different view from the one desired and from thus throwing out of position the lines already drawn, as the work proceeds.

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APPLICATION OF THE METHOD TO THE DISSECTION OF PIG EMBRYOS

The method here described by Mr. Longwell has proved to be very valuable in preparing pig embryos for general dissection. Embryos from 12 mm. to nearly full term were treated with about 1 per cent. HCl and either kept for 2 or 3 days in the refrigerator or, when weather was cold, out of doors and sometimes frozen. In some cases they remained in the refrigerator for a month. Some of the specimens were dissected immediately after rinsing the acid off with water and others were kept in about 1 per cent, solution of carbolic acid.

The treated specimens retain nearly the texture and pliability that they had when taken from the uterus. The muscles are rendered slightly more opaque rather than transparent as in the guinea pigs prepared by Mr. Longwell. The nerves, therefore, do not present the striking contrast to muscles in color which his specimens show. In case of the embryos, however, the slight opacity of the muscles is rather an advantage.

The advantages of the method as applied to the embryos are the complete lack of rigidity or brittleness, the extraordinary ease with which the adjacent parts can be separated when the connective tissue is partly dissolved. The epithelium separates from the true skin and the latter from the superficial fascia with the greatest ease. The skin muscles, for example, the platysma and facial and auricular muscles, show with diagrammatic clearness. The deeper muscles retain sufficient strength for purposes of dissection. The nerves retain their strength entirely and are white. It is easy to follow them to their minutest branches. The cerebrospinal and sympathetic ganglia are also tough.

The facility that the method lends to the dissection of embryonic glands and ducts is equally delectable. The ducts of the submaxillary and parotid in a pig of 100 mm. can still be followed to their ultimate branches. The liver becomes soft but when pinched between the fingers and washed the branches of the vessels, the gall bladder, cystic and hepatic ducts, etc., are left and the relation of the omenta and the foramen of Winslow are most satisfactorily exposed.

Tendons, fascia, the peritoneum, blood vessels and meninges retain sufficient toughness for satisfactory dissection. The brain and cord are of better texture and color than in either fresh specimens or those prepared in formalin or fixing agents followed by alcohol.

In general Mr. Longwell's method is invaluable in the dissection of pig embryos.

A. D. Mead